

**WHAT IS CLAIMED IS:**

1. A method comprising:
  - translating grouping values into nodes of a directed graph, wherein the grouping values are associated with periods of timelines, the timelines comprising data records;
  - distributing data through the nodes to obtain a modified subset of the data records;
  - re-distributing the data recursively along the nodes to obtain a modified directed graph; and
  - translating the modified directed graph into a modified plurality of timelines that include the modified subset of data records.
- 10 2. The method of claim 1, wherein the data records are subject to a time constraint such that temporal gaps between the data records are not allowed, and further wherein the modified subset of data records are in compliance with the time constraint.
- 15 3. The method of claim 1 comprising extending a data record preceding a temporary gap between data records caused by a modification of the data records through the temporary gap to a next-occurring data record.
4. The method of claim 1 wherein translating sequences of grouping values comprises:
  - 20 assigning identical grouping values to a single node; and
  - inserting edges of the directed graph between pairs of nodes that correspond to consecutively-occurring ones of the periods.
- 25 5. The method of claim 4 comprising representing a node of the directed graph based on a grouping value and beginning point of an associated one of the periods.
6. The method of claim 1 wherein distributing data through the nodes comprises:
  - 30 assigning each grouping value and its associated period an assigned color; and
  - coloring each node its assigned color to represent data, so that nodes having identical color share identical data.

7. The method of claim 1 wherein re-distributing the data comprises:  
associating data records of a first timeline and a second timeline from the plurality of  
timelines with a first grouping value; and  
5 synchronizing the data records.

8. The method of claim 1 wherein distributing data comprises removing a node  
from the directed graph that corresponds to a timeline period that is associated with a data  
record having data at its beginning.

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9. The method of claim 1 wherein distributing data comprises:  
traversing the directed graph and designating consecutive nodes identically so as to  
represent identical data stored in association with the grouping values represented by the  
consecutive nodes; and  
15 stopping the traversing upon reaching a differently-designated node.

10. An apparatus comprising a storage medium having instructions stored thereon,  
the instructions including:

20 a first code segment for selecting a first grouping value sequence associated with a  
first timeline, the first timeline including first data records;  
a second code segment for selecting a second grouping value sequence associated  
with a second timeline, the second timeline including second data records;  
a third code segment for mapping the first grouping value sequence and the second  
grouping value sequence into nodes of a directed graph; and  
25 a fourth code segment for representing data associated with a first grouping value in  
the directed graph by providing a first designation to a first node associated with the first  
grouping value.

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11. The apparatus of claim 10 wherein the first data records and second data  
records are subject to a time constraint such that no gap is allowed between any two of the  
first data records and second data records.

12. The apparatus of claim 11 comprising a fifth code segment for extending a data record that precedes a gap in its associated timeline, in violation of the time constraint, until the data record meets a succeeding data record.

5 13. The apparatus of claim 11 comprising a fifth code segment for recursively distributing data through the directed graph in response to a modification of one of the first data records, beginning with a high date of the first timeline and the second timeline, to ensure that all of the first and second data records are in accordance with the time constraint.

10 14. The apparatus of claim 13 comprising a sixth code segment for mapping the directed graph into a modified first timeline and a modified second timeline.

15 15. The apparatus of claim 10 wherein each grouping value is associated with a time period, and wherein identical data appears in the first timeline and the second timeline whenever a grouping value and period overlap.

16. The apparatus of claim 10 comprising:  
a fifth code segment for assigning identical grouping values to a single node of the directed graph; and  
20 a sixth code segment for inserting edges of the directed graph between pairs of nodes that correspond to consecutively-occurring ones of grouping values from the first grouping value sequence and the second grouping value sequence.

17. The apparatus of claim 10 comprising a fifth code segment for removing a 25 node from the directed graph that corresponds to a timeline period that is associated with a data record having data at its beginning.

18. The apparatus of claim 10 comprising:  
a fifth code segment for traversing the directed graph and designating consecutive 30 nodes identically so as to represent identical data stored in association with the grouping values represented by the consecutive nodes; and

a sixth code segment for stopping the traversing upon reaching a differently-designated node.

19. A system comprising:

5 means for associating nodes of a directed graph with grouping periods and grouping values associated with timelines;

means for associating an edge of the directed graph between succeeding grouping periods; and

10 means for distributing data associated with the timelines by operating on the directed graph, and thereafter translating the directed graph back into the timelines.

20. The system of claim 19 wherein the timelines comprise data records that are subject to a time constraint such that no temporal gap is allowed to exist between any two of the data records.

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21. The system of claim 19 comprising means for designating nodes of the directed graph as corresponding to grouping periods containing data.

22. The system of claim 19 wherein a grouping period and a grouping value are  
20 associated with identical data of the timelines.